Rudolph P. Darken

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Research Experience

Human factors of virtual environment systems, human-computer interaction, collaborative computing, wireless mobile computing, computer augmented training systems, team training systems, head-mounted displays, acoustic displays, tracking systems, real-time visual simulation, computer graphics, computer animation, multimedia.

Naval Postgraduate School, Computer Science Department 1996—present. Assistant Professor of Computer Science. Tenure track. Developed graduate courses on human-computer interaction, human factors of virtual environment systems, wireless mobile computing, and multimedia production. Research areas include virtual environment training systems, wireless mobile computing, bipedal locomotion input devices, team training systems, and acoustic environments. Technical advisor on four Small Business Innovated Research (SBIR) contracts each of which is developing a specific device for virtual environment research.

Naval Research Laboratory, Tactical Electronic Warfare Division 1991—1996. Director of the TEWD Virtual Environment Laboratory. One of the founding research scientists and principle investigator on the Human-Simulator Interaction project. Directly involved with the initial laboratory configuration and equipment procurement. Defined the general research agenda for the laboratory. Individual work involved broad-based research in virtual environments and user interface technology, investigating real-time immersive interface software architectures, and wayfinding and navigation in virtual spaces. Lead scientist on the Virtual Command and Control Workstation project which is investigating ways in which virtual environment technology can be applied to shipboard operations. Member of the NRL Human Subjects Committee.

Naval Research Laboratory, Information Technology Division summer 1991. Member of the Human-Computer Interaction Laboratory. Developed a user interface for a real-time software specification language which required management and navigation of large graphs.

The George Washington University 1990—1991. In the early stages of the department's computer graphics and animation program, designed and built a system for control of computer-generated animations. The system used a scripting language (similar to a primitive Renderman Interface Bytestream) to specify the visual characteristics of each frame and provided an X Windows-based wireframe previewer to view the resulting motion. The system was later replaced by a Renderman-compliant system.

University of Illinois at Chicago spring—summer 1990. Designed a system for the visualization of n-manifolds on a Connection Machine. Initially ported a serial version of the system to the Connection Machine and later added interactive capabilities. The system was written in C* from a Sun Workstation front-end. A hyperplane was interactively passed through an n-manifold resulting in a three-dimensional visualization of the intersection.

Argonne National Laboratory summer 1989. Built a system for on-line searching of mathematical libraries. A system was developed to browse and search the available mathematical libraries on the Cray X-MP to assist non-programming scientists in building software tools for data analysis.

Education

The George Washington University

DSc Computer Science October 1995. Advisor: John Sibert. Topic: Wayfinding in Large-Scale Virtual Worlds. Minor areas of study in Psychology (Human Factors) and Artificial Intelligence. Dissertation was a formal study of wayfinding techniques and tools in large virtual spaces.

MS Computer Science May 1993. Advisor: John Sibert. Topic: Navigation and Orientation in Virtual Space. Received superior mark on Master's comprehensive examination. Member Computer Graphics & User Interface Group since 1990.

Honors: Dr. A.M. Abdalla Award, 1990—1991

University of Illinois at Chicago

BS Computer Science Engineering August 1990. Advisor: Michael Lazlo. Senior design project in computational geometry implemented on a Connection Machine.

Honors: Member Tau Beta Pi National Engineering Society since 1988
Member Golden Key National Honor Society since 1988
United States Achievement Academy All-American Scholar, 1989
National Collegiate Computer Science Award, 1989
Phi Kappa Phi National Honor Society, 1990
Upsilon Pi Epsilon Computing Sciences Honor Society, 1990

Academic Positions

Naval Postgraduate School, Monterey, California: Computer Science Department 1996—present. Assistant Professor of Computer Science.

Refereed Publications

Darken, R.P., & Sibert, J.L. (1996). *Navigating in Large Virtual Worlds*. The International Journal of Human-Computer Interaction, 8(1), pp. 49—72.

Hahn, J.K., Gritz, L., Darken, R., Geigel, J., & Lee, J.W. (1994). *An Integrated Virtual Environment System.* Presence: Teleoperators and Virtual Environments 2(4), 353—360.

Conference Publications

Darken, R.P., & Sibert, J.L. (1996). *Wayfinding Strategies and Behaviors in Large Virtual Worlds*. Proceedings of ACM SIGCHI 96, pp. 142—149. (See also CHI 96 Conference video).

Darken, R.P., & Sibert, J.L. (1993). *A Toolset for Navigation in Virtual Environments.* Proceedings of UIST '93. 157—165.

Darken, R.P., Hill, T.A., Solan, B.T., & Brookes, C.B. (1996). *A Hybrid Virtual Environment Interface to Electronic Warfare Information*. Proceedings of the 1996 Modeling, Simulation, and Virtual Prototyping Conference. American Society of Naval Engineers (ASNE).

Darken, C.J., & Darken, R.P. (1995). *Virtual Reality + Artificial Intelligence = Intelligent Environments: A Synergistic Approach to Engineering Design Support.* Accepted for Publication to SPIE '96.

Darken, R., Tonnesen, C., & Passarella Jones, K. (1995). *The Bridge Between Developers and Virtual Environments: A Robust Virtual Environment System Architecture.* Proceedings of SPIE '95, (In Press).

Darken, R.P., (1995). *Wayfinding in Large-Scale Virtual Worlds.* Conference Companion ACM SIGCHI '95, 45—46.

Darken, R.P. (1994). *Hands-Off Interaction With Menus in Virtual Spaces.* Proceedings of SPIE '94, Stereoscopic Displays and Virtual Reality Systems. Vol. 2177, 365—371.

Darken, R.P., Sibert, J.L., & Shumaker, R. (1993). *A Study of Navigation in Virtual Space.* Proceedings of SOAR '93, NASA Conference Publication 3240. 51—60.

Academic Theses

Darken, R.P. (1996). *Wayfinding in Large-Scale Virtual Worlds*. The George Washington University, Department of Electrical Engineering and Computer Science; Doctoral dissertation.

Darken, R.P. (1993). *Navigation and Orientation in Virtual Space.* The George Washington University, Department of Electrical Engineering and Computer Science; Master's thesis.

Technical Reports

Boyd, C., & Darken, R.P. (1996). *Psychological Issues of Virtual Environment Interfaces: A CHI 96 Workshop*. SIGCHI Bulletin, 28(4), pp. 49—53.

Darken, R.P., Hill, T.A., & Solan, B.T. (1996). *A Hybrid Virtual Environment Interface to C3I Information*. The 1996 NRL Review, pp. 181-182. Naval Research Laboratory, Washington, D.C.

Darken, R.P., & Duckworth, A. (1994). *Investigating Navigation Strategies in Virtual Worlds: A GOMS Analysis.* NRL Technical Report number 5707-94-7471.

Darken, R.P., & Pérez, M.A. (1993). *Techniques for Navigating Large Graphs.* The George Washington University, Department of Electrical Engineering and Computer Science; Technical Report GWU-IIST-93-11.

Bergen, D.E., Darken, R.P., & Duckworth, A. (1993). *Applying Virtual Environment Technology to Large Scale Simulation Systems.* NRL Technical Report number 5707-93-9560.

Video Publications

Darken, R.P., & Sibert, J.L. (1996). *Wayfinding Strategies and Behaviors in Large Virtual Worlds*. Video proceedings of ACM SIGCHI 96.

Gritz, L., Bergen, D., & Darken, R. (1992). *Graphic Violence,* ACM SIGGRAPH '92: Animation Screening Room.

Presentations

Darken, R.P. (1995). *Techniques and Strategies for Navigating Large Virtual Environments*. ONR Workshop on Spatial Orientation and Navigation. Wood's Hole, MA. (invited speaker)

Darken, R.P. (1995). *Wayfinding in Large-Scale Virtual Worlds*. ACM SIGCHI '95 Doctoral Consortium. Denver, CO.

Darken, R.P. (1993). *The Application of Large-Scale Virtual Environments to Naval Tactical Simulation and Evaluation*. Virtual Prototypes 1993, Washington, D.C. (invited speaker).

Darken, R.P., Bergen, D.E. (1993). *Technology Opportunities in Synthetic Environments.* NRL Colloquium, Washington, D.C. (speaker and co-organizer).

Grants Awarded

February 2, 1995 — September 30, 1997 ($315K). Rudolph P. Darken. *Training Spatial Knowledge Acquisition Using Virtual Environments*. Awarded by Office of Naval Research (ONR). Performed in conjunction with N. Durlach of MIT.

January 1, 1997 — September 30, 1997 ($90K). Rudolph P. Darken. *3-D Auditory Displays in Aircraft Simulation and Training.* Awarded by the Naval Air Command, PMA 205-6B. Performed in conjunction with LT Russell Shilling of the USAFA.

July 1, 1996 — September 30, 1996 ($20K). Rudolph P. Darken. *High-Fidelity Model Development for Virtual Environment Navigation Training.* Awarded by Naval Research Laboratory (NRL/DC).

October 1, 1996 — September 30, 1997 ($25K). Michael J. Zyda, Rudolph P. Darken, William Cockayne. *Human Interaction in the Virtual Environment.* Awarded by the Office of Naval Research (ONR).

Professional Activities

Editorial Board member, Presence Journal 1996-
ACM SIGCHI '96 Workshop on Psychological Issues of Virtual Environment Interfaces (co-organizer)
NRL Virtual Environment Workshop 1995 (co-organizer)
NRL Colloquium (speaker and co-organizer) *Technology Opportunities in Synthetic Environments*

Professional Societies

Member ACM SIGGRAPH since 1989
Member ACM SIGCHI since 1991

References

John Sibert Associate Professor, Department of Computer Science and Electrical Engineering, The George Washington University, Washington, D.C. 20052 sibert@seas.gwu.edu (202) 994-4953

Terry Allard Cognitive and Neural Science and Technology ONR342, Office of Naval Research 800 North Quincy St. Arlington, VA 22217-5660 allardt@onrhq.onr.navy.mil (703) 696-4502

Nat Durlach Sensory Communication Group, Massachusetts Institute of Technology, Rm 36-763 50 Vassar St. Cambridge, MA 02139 durlach@vetrec.mit.edu (617) 253-2534

Rob Jacob Department of Electrical Engineering and Computer Science, Tufts University, Halligan Hall 161 College Ave. Medford, MA 02155 jacob@cs.tufts.edu (617) 627-3217

Additional references available upon request.